I CLAIM:

Claim 1. A road block comprised of a bollard and apparatus for actuating the bollard mounted below the surface of a roadway when in the retracted configuration, wherein the bollard can be extended above the roadway surface for arresting vehicles, comprising:

a foundation of reinforced cementatious material for mounting the bollard apparatus below the roadway surface; said bollard apparatus includes a stationary outermost anchor housing and a removable coacting casing which reciprocatingly receives the bollard therewithin, with said casing being removably supported within said anchor housing; biasing means for storing energy and connected to selectively expend the stored energy to lift said bollard at a relatively slow rate of extension respective the casing;

a double acting fluid actuated power lift having a fluid actuated cylinder, with there being a power piston reciprocatingly received within said cylinder and defining spaced upper and lower chambers; said power piston being connected to actuate said bollard between a retracted and an extended configuration responsive to a pressure deferential effected between said upper and lower chambers;

valve means, including a flow line connecting a source of power fluid to said upper and lower chambers for selectively introducing power fluid into said upper and lower chambers and for selectively exhausting spent power fluid from said upper and lower chambers, thereby controlling the pressure differential across said power piston; whereby, the valve means, when selectively moved into one operative position simultaneously applies power fluid to the lower chamber while exhausting power fluid from the upper chamber and thereby extending the bollard above the surface of the roadway, and the valve means when selectively moved into a second operative position simultaneously exhaust power fluid from the lower chamber while applying power fluid to the upper chamber for retracting the bollard; and circuity means connected for sequentially or simultaneously operating the valve means to selectively rapidly or slowly extend the bollard and to retract the bollard.

Claim 2. The bollard and apparatus of Claim 1, wherein the biasing means is connected to provide an upward force between the bollard and the casing by which the bollard is moved into the extended configuration when the valve means is moved into an operative position to equalize the pressure between said upper and lower chambers to slowly extend the bollard; said circuitry means in-

cludes switch means operatively connected to move the valve means into a position which exhaust the upper chamber pressure and thereby utilize the stored energy of the biasing means which slowly extends the bollard from the coacting casing.

Claim 3. The bollard and apparatus of Claim 1 wherein the biasing means is a spring having opposed ends connected to be compressed between the bollard and the coacting casing and thereby store energy to subsequently urge the bollard into the extended position in response to the pressure differential across the power piston reaching a value that is less than the force stored in the spring; wherein said valve means is connected to apply power fluid to said upper chamber to overcome the spring force in order to retract the bollard.

Claim 4. The apparatus of Claim 1, wherein the valve means is moved to a position to exhaust the upper chamber while applying pressure to the lower chamber to extend the bollard at a rate responsive to the magnitude of the pressure deferential imposed across the power piston.

Claim 5. The apparatus of Claim 4, and further including vehicle speed detector means arranged to actuate the circuitry means and to actuate the bollard into the extended position within a time frame that intersects and arrests the traveling vehicle.

Claim 6. The bollard and apparatus of claim 1, and further including abutment means formed between the bollard and the casing for limiting the extension and retraction of the bollard; the valve means being actuated by the circuitry means to reduce the pressure within the upper chamber at the beginning of bollard extension, and thereafter the valve means subsequently increases the upper chamber pressure prior to the termination of the bollard extension to thereby decelerate the bollard as the bollard nears the end of its extension, and wherein the valve means reduces the pressure within the upper chamber.

Claim 7. The apparatus of Claim 6, wherein the biasing means is a spring having opposed ends connected to be compressed between the bollard and the coacting casing and thereby urge the bollard into the extended position in response to the pressure differential across the power piston reaching a value that is less than the spring force stored in the spring; and a centralizer axially aligned with said bollard, said casing and said spring,

wherein one opposed marginal terminal end of the centralizer is telescopingly received within the bollard and the coacting spring with the other end of the centralizer being received within the coacting casing.

Claim 8. The bollard and apparatus of Claim 1, wherein the valve means is moved to a position to exhaust power fluid from the upper chamber while applying power fluid pressure to the lower chamber responsive to the circuitry means sensing the presence of a speeding vehicle and for providing a signal for sequentially operatively actuating the valve means into selected positions to connect the power fluid to the appropriate upper and lower chambers to rapidly extend the bollard, and thereafter to reverse the relationship of the fluid pressure imposed on the upper and lower chambers to arrest the extending bollard whereby the bollard non-destructively reaches the end of its travel.

Claim 9. The bollard and apparatus of Claim 8, wherein there is further included a centralizer supported on said casing, said biasing means is a spring slidably received about the upper marginal end of the centralizer while the centralizer and spring

are telescopingly received within the coacting casing; said spring is of a size to store energy therein that together with the power lift means accelerates the bollard into an extended position.

Claim 10. A road block comprising a bollard apparatus for stopping a vehicle traveling along a roadway leading to a security area wherein the bollard is controlled to prevent intrusion of a vehicle possibly containing terrorists; the improvement comprising:

said bollard apparatus being reciprocatingly received within a removable casing, said casing being telescopingly received within a fixed foundation outermost anchor housing, with the anchor housing being embedded within a foundation of cementatious material;

a centralizer having opposed ends; a power spring having upper and lower opposed ends compressible towards each other for storing energy, a power lift means having a piston connected to reciprocate said bollard, said piston being reciprocatingly received within and dividing the power lift means into upper and lower chambers for extending and retracting said bollard responsive to power fluid applied thereto;

valve means connected to selectively flow power fluid

from a source into and from said upper and lower chambers; spaced abutments for limiting the extension and retraction of said bollard;

one opposed end of said centralizer being supported within and respective the casing with the other end of the centralizer being received within the bollard, and a marginal end of the spring being positioned within the bollard and the opposed marginal end of the spring being received about the upper marginal end of the centeralizer, and, a spring stop on said centralizer for compressing one end of the spring; and with the power lift being supported respective and within the centralizer;

the opposed ends of said spring being connected to be compressed between the bollard and the centralizer to thereby store energy to urge the bollard into the extended position in response to the pressure differential across the power lift piston reaching a value that is less than the force stored in the spring; and means for applying power fluid to said upper chamber to overcome the spring force and thereby retract the bollard from the extended into the retracted position; and,

circuitry means and detector means operatively connected to actuate said valve means to extend said bollard in response to a vehicle accelerating at a predetermined rate of speed.

Claim 11. The improvement of Claim 10, wherein the power spring is connected to provide an upward force between the bollard and the removable casing by which the bollard is moved into the extended configuration when the valve means is moved into a selected operative position to thereby equalize the pressure between said upper and lower chamber; and slowly extend the bollard; said circuitry means includes switch means operatively connected to move the valve means into a position which exhaust the upper chamber pressure and thereby utilize the stored energy of the power spring which slowly extends the bollard from the coacting casing.

Claim 12. The improvement of Claim 10, wherein the power spring is a coiled spring having opposed ends connected to be compressed between the bollard and the coacting casing and thereby store energy to subsequently urge the bollard into the extended position in response to the pressure differential across the piston reaching a value that is less than the force stored in the power spring; and means for applying power fluid to said upper chamber to overcome the power spring force in order to retract the bollard.

Claim 13. The improvement of claim 10, and further including speed detector means connected to actuate switch means which in turn is connected to actuate said valve means; and wherein the valve means is operable in response to the detector means that electronically determine the rate of acceleration of an oncoming vehicle and to actuate the bollard into the extended position within a time frame that intersects and arrests the traveling vehicle.

Claim 14. The improvement of Claim 10, and further including abutment means for limiting the extension and retraction of the bollard; the valve means being actuated by said switch means to reduce the pressure within the upper chamber at the beginning of bollard extension and the valve means subsequently increases the upper chamber pressure prior to termination of the bollard extension to thereby decelerate the bollard as the bollard nears the end of its extension; and, wherein the valve means reduces the pressure within the upper chamber by connecting the upper chamber to exhaust power fluid at the beginning of the bollard extension and thereafter the valve means connects the upper chamber to the power fluid to decelerate and cushion the impact of the bollard against the abutment means therefor.

Claim 15. Method of controlling flow of vehicular traffic along a roadway, comprising the steps of:

step 1. providing a below grade foundation of cementatious material having an upwardly opening chamber formed therein that terminates near the surface of the roadway;

step 2. placing an anchor housing within said chamber and attaching the anchor housing to the cementatious material of the foundation whereby lateral and torsional forces imposed on said anchor housing are transferred into the foundation;

step 3. reciprocatingly receiving a bollard within a coacting casing and telescopingly installing said bollard and coacting casing in axially aligned relationship within said anchor housing in a removable manner such that the upper end of the bollard bollard assembly terminates at the roadway surface when the bollard is retracted;

step 4. extending and retracting said bollard by the provision of a power operable lift means having a piston reciprocatingly received within a power cylinder and coupled for reciprocating said bollard into an extended and retracted configuration respective said coacting casing, and further including the step of slowly extending said bollard by using a biasing means which overcomes the weight of said bollard by storing energy therein when retracted;

step 5. maintaining the bollard in the retracted configuration by applying a downward force on said piston by positioning a valve means to flow power fluid into the power lift means and thereby exert sufficient downward force on the bollard to overcome the energy stored in a biasing means.

Claim 16. The method of Claim 15, wherein the valve means are positioned to continuously maintain a relatively small pressure differential across the piston that is of a magnitude to restrain the bollard in the retracted position when in the standby configuration.

Claim 17. The method of Claim 16, and further including the step of actuating said valve means to slowly extend the bollard by using a switch means connected to move the valve means into a position which reduces the pressure differential across said piston to thereby release the stored energy of the biasing means which slowly extends the bollard from the coacting casing.

Claim 18. The method of Claim 15, and further including the steps of using a power spring as the biasing means and connecting opposed ends of the spring to be compressed as the bollard is retracted within the coacting casing and thereafter urging the bollard towards the extended position in response to the pressure differential across the piston reaching a value that is less than the spring force stored in the spring.

Claim 19. The method of Claim 15, wherein the valve means is moved to a selected operable position according to the steps of:

step 6. providing a dictionary of stored terms related to a profile of a vehicles' actions when operated by a terrorist; wherein the profile includes the various actions expected of the vehicle during a period of time immediately prior to the consummation of a mission;

step 7. providing a dictionary of stored terms related to a profile of a vehicle operated by a law abiding citizen wherein the profile includes the various actions expected of the vehicle during normal driving conditions for the particular area involved;

step 8. measuring the velocity and acceleration of a vehicle as it approaches a security area; and comparing the last said stored data to the profile of step 1 and step 2 above; and,

Step 9. whenever said comparison of said vehicle profile of step 3 with said dictionary of stored knowledge of step 1 and step 2 indicates a critical situation is present, the extension of the bollards commences with the on-coming vehicle being at a distance that provides sufficient time for the almost instantaneous extension of the road block apparatus; whereby, the bollards of the road block apparatus are fully extended simultaneously with or before contact of the vehicle.

Claim 20. The method of Claim 19, wherein, after step 3 has been completed, should said comparison be inconclusive, the road block of this disclosure is slowly actuated; whereby the bollards of the roadblock are extended during a time interval that enables the vehicle to decelerate prior to encountering the roadblock.